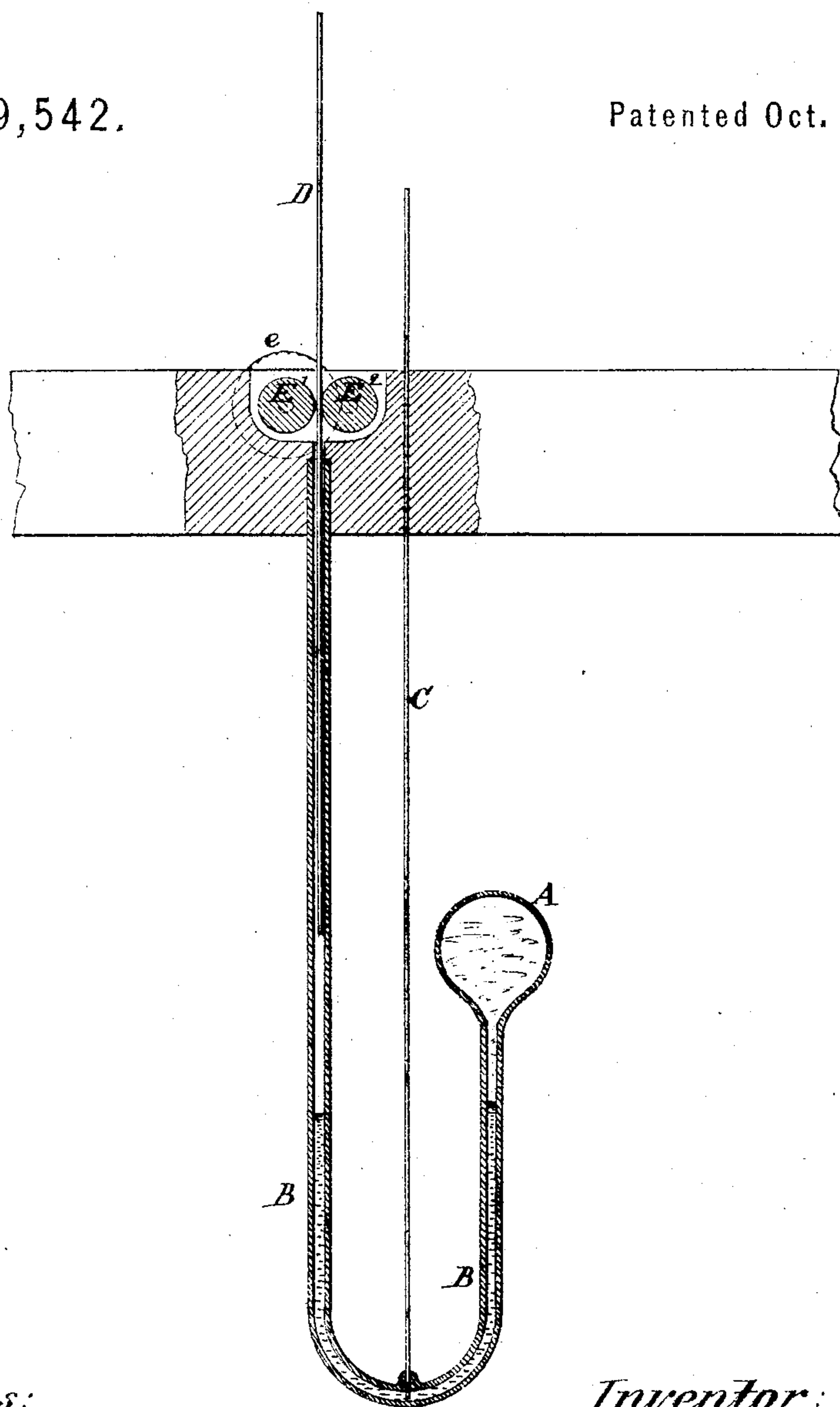


G. M. Sternberg Electric Thermometer.

No. 119,542.

Patented Oct. 3, 1871.



Witnesses:

C. Raettig.
W. C. Livingston

Inventor:

Geo. M. Sternberg
by his atty *C. J. Peterson*

UNITED STATES PATENT OFFICE.

GEORGE M. STERNBERG, OF NEW YORK, N. Y.

IMPROVEMENT IN ELECTRO-MAGNETIC THERMOMETERS.

Specification forming part of Letters Patent No. 119,542, dated October 3, 1871.

To all whom it may concern:

Be it known that I, GEORGE M. STERNBERG, of New York city, in the State of New York, have invented certain new and useful Improvements in Electro-Magnetic Thermometers.

The invention is more particularly intended for use in connection with the magnetic regulation of temperature described in the patent issued to me dated March 1, 1870. That patent calls for a thermometer with an adjustable wire extending down into the tube. The rising and sinking of the mercury with changes of temperature alternately makes and breaks a galvanic circuit, which, through the aid of an electro-magnet and certain clock-work and valves, induces a change in the fire or in the warming means which restores the temperature again to the point for which it is regulated. The apparatus maintains the temperature near the point corresponding to the position of the lower end of the wire. Means being provided for raising and lowering the wire, the degree to which the temperature is regulated may be raised and lowered at pleasure.

A difficulty is found in the want of sensitiveness of the thermometer. The introduction of a wire requires a larger bore than usual in the tube, and this requires, under ordinary conditions, a large amount of mercury to induce a sufficient expansion. A large thermometer with a large quantity of mercury is inconvenient on several accounts.

There is a kind of thermometer sometimes known as "Sitz maximum and minimum thermometer," in which the tube is bent in a U-form, and the bulb at the top of one of the arms is filled with alcohol. The alcohol extends a little distance down that arm of the tube, but the whole lower portion of the U is filled with mercury.

I have successfully adapted this form of thermometer to serve the purposes desired in my adjustable thermometer. I fix a U-shaped tube, with a bulb filled as described, in a suitable mounting, with a conducting-wire, and means for adjusting it up and down, and with another wire to form the other conductor hermetically sealed in the tube near the lower portion of the U. The instrument works very successfully and fulfills all the conditions required.

The accompanying drawing forms a part of this specification.

Referring to it, A is the bulb, and B the U-shaped tube. C is a wire, hermetically sealed in the tube, and communicating with the mercury inside, while D is an adjustable wire, which may be conveniently moved up and down in the open arm of the tube B by turning one or both of the pinching-rollers E¹ E². I provide for turning one of these conveniently by the milled wheel e: the turning of one turns the other by friction, and raises and lowers the wire D as far as may be necessary.

The operation has been already briefly described. A rise of temperature expands the alcohol in the bulb A, presses down on the mercury in its branch or arm U, and forces it up in the other. As soon as a contact is made between the mercury and the wire D a galvanic circuit is completed between the wires C and D, and the action of the current, operating through suitable mechanism, induces a lowering of the temperature. If the temperature is lowered too much the contraction of the alcohol causes the lowering of the mercury and a breaking of the connection, and consequently of the circuit, which, in its turn, induces a change of conditions through the mechanism in the opposite direction, and the temperature again rises.

The alcohol or equivalent light liquid in the bulb renders the apparatus more sensitive than when all is mercury. The difference in expansion with heat is not, probably, determined with absolute certainty, but it is manifold. Air is sufficiently expansible, but it would be affected by changes in the barometric conditions, and it is far preferable to employ an expansible light liquid, among which I esteem alcohol the most available.

I claim as my invention—

The U-shaped thermometer, having mercury in the base and a light liquid in the bulb, with a hermetically sealed conductor, C, and an adjustable conductor, D, combined and arranged for operation relatively to each other, and to suitable mechanism for controlling temperatures, as and for the purposes herein set forth.

In testimony whereof I have hereunto set my name in presence of two subscribing witnesses.

GEORGE M. STERNBERG.

Witnesses:

C. C. LIVINGS,
J. A. SURFLEIT.

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